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ABSTRACT

A study of 10 organizations explored how their various certification or accreditation programs were developed, structured, and managed and made observations to guide the development of certification or accreditation for the electronics industry. From November 1994 through January 1995, a phone and fax survey was conducted of these organizations: American Institute of Certified Planners, American Society for Nondestructive Testing, American Welding Society, Associated General Contractors of America, Electronic Technicians Association International, Federal Aviation Administration, International Society of Certified Electronics Technicians, National Automotive Technicians Education Foundation, National Institute for Automotive Service Excellence, and Printing Industries of America. All eight organizations with certification programs required the individual to have some work experience and tested examinees for knowledge of relevant subject matter. The majority developed their own tests, and tests were continually revised with input from industry. All four organizations that accredited training programs required an industry-based curriculum; three required certified instructors and had stated minimum standards for facilities, administration, and equipment. (A large part of the report provides study findings for each program reviewed, including program content, structure, and management; process; and observations. A list of conclusions follows. Appendixes include a summary in table format and questions for the case study.) (YLB)

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ED 396 133

NATIONAL SKILLS STANDARDS DEVELOPMENT PROJECT

Study of the State of the Art

of

Certification and Accreditation Programs

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Appendix A Summary Chart of Study Findings

Appendix B Questions for Case Study

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Much of the data in this report were collected as responses to questions posed by the EIF staff and subcontractor. Although every effort has been made to assure their accuracy, it was not always possible to verify the responses.

NATIONAL SKILL STANDARDS DEVELOPMENT PROJECT STUDY
Of the State of the Art
of
Certification and Accreditation[1] Programs

I. Introduction

As American industries transform to the high performance workplace, the assurance that workers are able to do the tasks required of them becomes increasingly important to employers. To provide that assurance, a growing number of trade associations and similar organizations are establishing programs to certify workers as qualified for stated levels of work or to accredit training programs. Among them are the Electronic Industries Association (EIA) and its non-profit foundation, the Electronic Industries Foundation (EIF).

Under funding from the U.S. Department of Education, EIA and EIF have undertaken a project designed, in part, to develop recommendations for the industry regarding establishment of a quality assessment program (certification, accreditation, or a combination of the two). Toward that end, project staff conducted a phone and fax survey, from November 1994 through January 1995, of 10 organizations that have developed and operate certification or accreditation programs, or both, in behalf of their industries. Organizations were selected for the survey on the basis of similarity of underlying issues to those facing the NSSDP and the electronics industry; because they were perceived as having leading edge programs; and because their inclusion provided a breadth of industries and a look at both publicly and privately funded programs.

The study was undertaken to ascertain how the various programs were developed, structured, managed, and other characteristics and to make some observations that might guide the development of certification and/or accreditation for the electronics industry. Programs of the following organizations were studied:

American Institute of Certified Planners (AICP)
American Society for Nondestructive Testing (ASNT)
American Welding Society (AWS)
Associated General Contractors of America (AGC)
Electronic Technicians Association International (ETA)
Federal Aviation Administration (FAA)

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[1] Accreditation as used in this report refers to review and approval of discrete training programs by an industry body, *not* to the approval of schools by designated regional and national bodies established for that purpose.

International Society of Certified Electronics Technicians (ISCET)
National Automotive Technicians Education Foundation (NATEF)
National Institute for Automotive Service Excellence (ASE)
Printing Industries of America (PIA)

II. Summary of Findings

The programs vary enough so that it is useful to study each for the information it can contribute to decision making by organizations considering establishment of quality assessment programs. Project findings are included as the next section of this report. This section summarizes similar and contrasting characteristics of the 10 programs. A chart depicting the information is included as Appendix A.

Program Content, Structure, and Management

Certification Programs

Eight organizations have programs to certify individuals. All require that the individual have some work experience to be eligible for the certification test. All test examinees for knowledge of relevant subject matter. Minimum scores for passing range from 70 to 75 percent. Only the FAA and AWS require performance tests.

Some of the certification programs are long-standing, 15 years or more, with the FAA's certification program having been in operation for 40 years. Annual budgets for the programs range from $25,000 to $208,000. Most are self supporting, but they noted that it takes years (up to 20) to become so. Generally, one or two persons staff the programs and the certifying body, using inhouse staff, conducts marketing and program management activities. The smaller, newer programs rely on volunteer test supervisors; the larger programs, such as those operated by the FAA and ASE, use paid test supervisors. The tests usually are administered at a public school, college, or vocational or technical training site. One organization uses local hotels.

The majority of programs develop their own tests, but one uses American College Testing (ACT) and another the Educational Testing Service (ETS); both are professional test development and administration services. Tests are continually revised with input from industry. The programs charge testing fees ranging from $20 to $375 with the higher fees common when certification is required for licensing or for contract requirements.

Accreditation Programs

Four of the ten organizations accredit training programs. All require an industry-based curriculum as a minimum standard for accreditation. Three require that instructors be certified and have stated minimum standards for facilities, administration, and equipment. Three require that the applicant institution spend at least 1 year conducting a self evaluation and make appropriate changes before a site visit by an accreditation team.

Accreditation programs are established primarily to improve the quality of training programs and curricula that prepare workers in a given field. One program has been operational for only 4 years, one for 10, one for 20, with the FAA's operating for 40 years. Typically, accreditation programs have begun within one state and, upon proving the concept, have been marketed and developed to the national level. Acceptance at the national level can take several years.

None of the programs studied is completely self sufficient; all require considerable ongoing financial support from industry. For example, Rockwell Graphic Systems is a major sponsor of the PrintED program. NATEF annually allocates $300,000 to its accreditation program. The program has a full-time operations staff of four. Other management and budget information was not made available to project staff.

III. Detailed Findings

This section reports on study findings for each certification and accreditation program reviewed. Participating organizations were asked a series of questions designed to elicit information how and why the organization began the program; about the program's structure and management; and about the process of certification or accreditation. The questions are included as Appendix B.

American Institute of Certified Planners

In affiliation with the American Planning Association (APA), the American Institute of Certified Planners (AICP) is a self-governing unit that concentrates on the development of the land use planning profession, its standards, and continuing education. The APA was formed in 1978 by a consolidation of the American Institute of Planners (AIP) and the American Society of Planning Officials. Members of these two organizations in 1978 were "grandfathered" into the new AICP.

For others, membership in the institute is dependent upon passage of a written AICP examination. Once gained, membership is permanent. Benefits of membership higher pay and grades, greater prestige, marketing advantages, and enhanced career opportunities — especially for younger members in the field. Just over 25 percent of the APA members belong to the 7,600-member AICP.

Until recently, AICP has accredited college and graduate level degree programs in planning. In 1991, program accreditation was turned over to an independent Planning Accreditation Board, sponsored jointly by the AICP and the Association of Collegiate Schools of Planning. Some 60 programs currently are accredited.

Program Content, Structure, and Management

The written examination consists of 150 multiple choice questions covering knowledge (40 percent) and skills (60 percent). Examination topics include history, theory, law, planning, methods, strategies, techniques of planning, functional topics (land use, energy, etc.), plan implementation, public interest, and ethics. Exams are evaluated annually to assure equality from year to year to maintain equivalence in the passing score requirement.

The AICP contracts with the Educational Testing Service to develop, maintain, and administer its written examination, which replaced an earlier AIP oral exam. Approximately 700 to 1,000 APA members take the certification exam each year. In 1995, the fee was $225. Annual examination revenue from 1989 through 1992 averaged $209,024, roughly equalling average expenses of $208,308. The Institute's total annual budget was just over $1 million from dues and training services.

Process

Exams are given each year on one date in May at some 150 college-based testing centers throughout the United States and Canada. ETS and other testing agencies maintain networks of testing centers with experienced supervisors and proctors. Only APA members are eligible to sit for the exam. In addition, examinees must have from 4 to 8 years' work experience or from 2 to 3 years' work experience and a bachelor's or graduate degree from an APA-approved program. New Jersey and Michigan include the exam as part of state licensing requirements. In those states, 30 to 40 percent of examinees tend to pass the test, in contrast to a 60 percent pass rate among voluntary test takers.

Observations

- Certification is sought most frequently by land use planning consultants interested early in their careers in adding to their resumes and enhancing their credentials. Some government agencies provide incentives for their planners to seek AICP membership. Required passage in two states also is a key to sustaining use. Less than one in four APA members have become certified. Demand is clearly tied to career rewards.

American Society for Nondestructive Testing

The American Society for Nondestructive Testing, Inc. (ASNT) is a professional technical society that crosses the disciplines of science, engineering, and technology. Founded in 1941 as the American Industrial Radium and X-Ray Society, it changed its name in 1946 to the Society for Nondestructive Testing to reflect more accurately its scope of interest and industry. The word "American" was reinstated in 1967. Today, the society is composed of more than 10,000 members in 91 local sections (chapters) throughout the United States and in three foreign countries. The society sponsors conferences, trade shows,

seminars, and topical meetings, and conducts an ambitious publications program to present the latest information on various NDT techniques and emerging areas for future study and development. Its certification program is 40 years old.

Program Content, Structure, and Management

A national certification board oversees a three-level certification program and administers examinations for Level III certification. ASNT has produced guidelines that enable employers to qualify and certify NDT personnel at Levels I and II.

The Level III exam consists of a basic section and 10 special methods sections. Level III examination tests basic knowledge and knowledge of methodology in 10 specialized areas of nondestructive testing: radiography, magnetic particle, ultrasonic, liquid penetrant, eddy current, neutron radiography, leakage, acoustic emission, visual, and thermal infrared. The society provides study materials and refresher courses for the Level III exam. The fee for a two-part Level III exam (basic and one method) costs $375; the fee for the basic exam and five method exams, the maximum that can be taken at one sitting, is $815. The testing program is self supporting. Demand for Level III certification is consistently strong, probably because contracts tend to specify nondestructive testing by Level III certified NDT personnel.

Process

The society tests about 1,200 Level III candidates annually, administering the examinations itself three times a year in one to three locations in the United States and, in 1995, in England, Japan, Korea, and Mexico. It uses local hotels as test sites. To be eligible for the Level III examination, an individual must have met academic and work experience requirements appropriate to that level and provide references. Exams are given over a 3-day period, with two 4-hour sessions each day. Most of the exams take 4 hours to complete. Tests are given in paper and pencil format. Performance assessments are being considered for the future. Certification lasts for 5 years with renewal achieved through successful re-examination or by documented Level III experience.

Observations

The society has a viable program in a highly specialized niche in which demand is intensive but not extensive. The few persons who need the credentials will invest time, travel, and substantial fees to take the exam. The key to success is the intense demand, which motivates both individuals and their companies.

American Welding Society

The American Welding Society (AWS) was founded in 1919 to advance the science, technology, and application of welding. It has 42,000 members, with an annual budget of

over $12 million. It became involved in certification when concerns from the shipbuilding, bridge construction, and similar industries illuminated the need to identify standards for an acceptable weld. The society also has developed training courses for inspectors.

Program Content, Structure, and Management

The Certified Welding Inspector (CWI) exam consists of three sections: 150 questions addressing fundamentals; 46 open code book questions; and 46 practical questions, which based on codes, plastic model examples (5 sets), and pictures of completed welds.

The welders exam consists chiefly of a practical demonstration of the examinee's ability to weld different materials to a set of specifications.

The AWS funded work with volunteer groups to design and conduct the CWI program, which has grown slowly since it was initiated in 1976. The CWI exam costs $250 for members and $310 for non-members. The program recently attained break-even status. There currently are some 17,000 certified welding inspectors.

AWS estimates it took 3 years to develop the exam and cost approximately $75,000.

The newer program to certify welders is growing slowly but steadily: In its first year, it served 100 welders; last year, 500 took the exam. There are some 600,000 welders, according to 1992 statistics.

Process

The examinee receives a multi-level mastery report. Full certification is awarded to those who attain a targeted level of mastery, expressed as a passing score of 72 percent or better; associate inspector status is awarded to those who attain a second level. On recent test administrations, some 70 percent met the requirements for full certification, 25 percent attained the associate level, and 5 percent failed. The exam takes 6 hours to complete.

The welders certification exam is available at only 34 sites, well below the AWS target of 150 sites.

Observations

- The long-term subsidization of these tests by AWS underscores the difficulty of maintaining program viability in the absence of industry demand or requirements. Large numbers of potential examinees in a field, in this case 600,000 welders, do not assume demand for certification.

Associated General Contractors of America

The Associated General Contractors of America (AGC), incorporated in 1921, is a full-service construction association representing 8,000 general contracting firms, 10,000 national associate members, and 15,000 industry associates. It has 100 local chapters nationwide, located in all 50 states. The AGC serves large and small union and non-union contractors.

Around 1970, the AGC leadership became concerned about a possible shortage of skilled craftworkers. It first generated skill standards in residential carpentry, commercial carpentry, and brick and stone masonry, which it has updated every 3 to 5 years, often based on new OSHA requirements. Next it developed curricular materials, which it also continually update. It recently added videos to these materials; interactive video disc programs are in the works. In 1975 it began accrediting training programs.

In 1989, after implementing its accreditation program, the AGC created a voluntary certification program. Individuals take the tests chiefly to give them an advantage in hiring. Contractors see an advantage in citing their employment of certified craftworkers, although they complain when certified workers leave them for better jobs. Some 15 to 20 percent of test takers are instructors interested in documenting their knowledge of the field.

Program Content, Structure and Management

Certification

The AGC offers a total of eight certification exams in three areas: form, frame, and finish in residential carpentry; form, frame, and finish in commercial carpentry; and brick and stone masonry. The examinations include 50 to 90 multiple choice questions and require from 1 to 1-1/2 hours to complete. Test takers may use calculators.

Some 2,000 certification tests were administered in 1990. Volume has declined since then, and in April 1994 only 600 tests were given in all categories. AGC charges $30 per candidate for the tests. Income from testing in 1994 amounted to just over $18,000. The AGC subsidizes just under 50 percent of total costs of the program. Total estimated costs are around $40,000. Approximately 6,000 craft workers have been certified since the program first was implemented.

Accreditation

The AGC has accredited 225 programs in 20 states in residential and commercial carpentry and brick and stone masonry. Accreditation is granted programs in the same three craft areas in which certification tests are given. The AGC provides information and application materials to programs seeking accreditation. Local chapters conduct the accreditation process, which is carried out without charge to the training program.

Process

Certification

Certification tests are administered at 63 test sites in 25 states. Test centers, housed in local chapter offices, are unevenly located. New York has one, in Albany; Alabama has six; and Michigan has five. Indiana, Pennsylvania, Virginia, Florida, New Jersey, Connecticut, and Massachusetts have none. Local association members supervise administration of the tests.

AGC substitutes work experience for a performance section of the exams: To be eligible to take the tests, an individual must have 2 years' experience or 1 year in an approved program or apprenticeship. Actual scores are reported only to the test taker for purposes of self evaluation. An individual either is approved for certification or is not. The cutoff score for certification has been set at 70 percent. This seemed to equate well with training supervisors' ratings: examinees who correctly answered 70 percent or better of test questions also consistently received positive ratings from supervisors.

Master certification is awarded to persons who pass all tests in one field within a 2-year period. A certificate is valid 5 five years. Recertification is granted to individuals who can document an average of 1,000 work hours annually for the 5 years covered by the certificate or to individuals successfully retaking the examination.

Test questions are updated as appropriate. Item analysis procedures are used to detect possibly flawed items, but tests are not evaluated for equality from year to year.

Accreditation

Training programs begin the accreditation process by completing an application booklet, available from the national AGC office, completing the booklet, and submitting it to the local AGC chapter. The chapter names a school administrator, state educator, and industry representative to form a site visit team. Following the site visit, the application booklet and the review team's findings are sent to the national office for a final decision. Approval is based on eight weighted AGC standards: goals and objectives (10 points), educational setting (10 points), industry advisory committee (20 points), administrative support (10 points), instructional materials (20 points), instructional staff (10 points),

facilities and equipment (10 points), and learning resources (10 points). Following approval, local chapters conduct annual site visit reviews. Chapter participation is voluntary and not universal, perhaps because there is no fee charged for the accreditation process and no reimbursement from the national organization to the local chapters.

Students completing an accredited program receive an AGC "certificate of competence," which gives them credit toward advanced standing in subsequent training or apprenticeship programs.

Observations

- The AGC program, which was developed by and is operated by a trade association, nonetheless demonstrates the difficulty in creating demand for a voluntary test in the absence of industry consensus that it is useful. Using Department of Labor statistics, only .6 percent of 978,000 working carpenters have sought certification. Possibly, these are crafts in which paper and pencil testing is viewed as a very limited measure of competence.

Electronic Technicians Association International

The Electronic Technicians Association International (ETA) focuses on service to individuals. ETA provides its technician members a range of services, including instructional materials for home and small group study, networking among members, and certification at four levels.

Program Content, Structure, and Management

The examination consists of a basic Certified Electronics Technician (CET) exam and 11 specialty exams covering eight occupational areas:

- Consumer electronics (TV, VCR, hi-fi, and radio)
- Video distribution (MATV, cable, antenna)
- Radio communications (2-way, RF, Tx)
- Telecommunications (data tx, cellular, mw)
- Industrial (process control, CNC, DC power)
- Computer (Pcs, peripherals, digital)
- Biomedical (safety, EKG, electrosurgery)
- Satellite-tvro (installation, troubleshooting)

ETA launched its CET program 30 years ago to create a vehicle to increase professionalism among electronics technicians. Certification offers individuals prestige based on demonstrated knowledge of technical content. The exam is given at four levels: associate, journeyman, senior and master.

Test fees range from $30 to $90, the latter for the master exam. Fees cover the cost of the program, but unpaid volunteers serve as test proctors, reducing administration costs. Certification administrators in the 45 states in which the tests are offered set their own schedule for administering the exam.

There are an estimated 35,000 certified electronics technicians nationwide. In 1994, a total of approximately 900 individuals who had not taken the test previously took the four levels of examinations. Approximately 350 examinees are certified annually. Numbers of test takers have increased recently, possibly as a result of publicity surrounding publication by EIA and EIF of skill standards for electronics technicians. A significant majority of first-time test takers took the entry-level Associate Electronics Technician (CET) exam, probably because recruiting for the tests can be concentrated most easily at training sites.

The pass rate at the associate level is low - 25 percent pass on the first attempt, 40 percent on the second. Persons who fail are given a free retest.

Process

No work experience is required for eligibility for the associate level exam. Eligibility for journeyman and master certifications require 4 years' experience; eligibility for the senior exam requires 8 years' experience. The exams are promoted through posters at schools and flyers and brochures sent to training sites for distribution by instructors. The basic CET exam makes use of a simple paper and pencil 75-question test. The other three levels offer 11 specialty exams, also pencil and paper tests of 75 questions each. Associates must pass the basic exam with a score of 75 percent or better; journeymen must pass at least one specialty exam in addition to the CET; seniors must pass the CET and one or more specialty exam with a score of 85 percent or better; master technicians must pass the CET and at least six specialty exams.

Observations

- The CET exam has had only token success, indicating again that the size of an occupational group in no way determines the success of a certification program.

- ETA heavily promotes the certification program to recent program graduates and at training sites. Thus, the program is education focused not industry focused, a direction that may be necessary for programs of this nature.

Federal Aviation Administration

Certification of airframe and powerplant mechanics in the aviation industry is regulated by the Federal Aviation Administration (FAA) of the U.S. Department of Transportation. FAA regulations (FAR) for "airmen other than flight crew members" prescribe the requirements for certification and rating as a mechanic. The administration

issues single mechanic certificates with an Airframe (A) rating, Powerplant (P) rating, or both (A&P) ratings to qualified applicants.

Although U.S. air carriers do not require mechanics to hold FAA certification for employment, in fact, nearly 100 percent are certified. Every year, 14,000 to 18,000 mechanics are certified. Currently, 350,000 A, P, and A&P mechanic certificates are listed, but there is no accurate estimate of total numbers of active certified mechanics because the system has not been purged.

There is no requirement for recertification.

FARs also regulate the accreditation of all aviation maintenance technician schools (AMTS), covering both curriculum requirements and operating rules. The applicable regulations were completely revised in 1970, increasing the required core curriculum hours from 1,500 to 1,900 and providing upgraded subject content and teaching guidelines. In excess of 200 institutions are accredited by the FAA to provide airframe and powerplant mechanics training.

The FAA disseminates program descriptions and regulations upon request but makes no major effort to market either the mechanic certification test or school accreditation programs.

Program Content, Structure, and Management

Certification

Written certification examinations for airframe and powerplant mechanic certification consist of three separate tests: Aviation Mechanic General Test; Aviation Mechanic Airframe, Section 1 - Airframe Structures, and Section 2 - Airframe Systems and Components; and Aviation Mechanic Powerplant, Section 1 - Powerplant Theory and Maintenance, and Section 2 - Powerplant Systems and Components. Written exams consist of objective, multiple choice questions. Each question has one best answer and three wrong or unacceptable answers.

The certification program is managed nationally through the Office of Flight Standards, Aircraft Maintenance Division and administered locally through Flight Standards District Offices (FSDOs). Written, oral, and practical tests are given. Written tests are administered either by FAA district offices, in which case there is no fee for the exam, or by approved written test examiners who can charge a fee. Oral and practical tests are administered by FAA-designated mechanic examiners, who may charge a fee. However, examiners furnish the testing facility and usually can arrange to supply the tools, materials, and necessary supplies.

Accreditation

The curricula of FAA-accredited AMTS training programs are based in part on an FAA-commissioned study, "The National Study of the Aviation Mechanic's Occupation," to determine the knowledge, skills, and abilities required of an aviation maintenance technician. Some of the findings formed the basis for FARs regulating the schools. Although the study does not constitute an AMTS curriculum, it does provide a partial foundation for the development of sound curricula.

The FAA manages AMTS accreditation nationally through its Office of Flight Standards and locally by the FSDOs. A school may be FAA-certified for airframe, powerplant, combined airframe and powerplant ratings, or any combination of the three.

Process

Certification

A candidate for FAA mechanic certification must have gained 18 months' practical airframe or powerplant experience or successfully completed a required curriculum before being eligible to take the written test for a single rating or have gained 30 months' concurrent practical airframe and powerplant experience before taking the written test for a combined A&P rating. The candidate may work and take courses concurrently by working under the direct supervision of a certified technician.

New test questions in 126 subject areas are developed from advisory materials from industry. They are fed into a pool of approximately 1,000 questions from which the individual tests are created. The FAA anticipates that within 2 years all questions will be stored in a computer system that will randomly select from the pool for development of the tests.

An examinee must achieve a minimum grade of 70 to pass the written tests. Grades usually are reported within 5 days or immediately following the exam if scored by computer. Those who fail the test or any section of it may be apply to be retested 30 days later or upon presentation of a statement certifying the examinee has received at least 5 hours of additional instruction in each of the subjects failed and the inspector now determines that the applicant is ready for retesting.

Practical and oral tests are usually the final components of the certification process. Practical testing consists of projects assigned by the examiner, an FAA flight standards inspector or an FAA-designated mechanic examiner. Oral testing includes questions related to the assigned practical projects, questions on unrelated areas where skill demonstration is impractical, and questions to determine whether additional projects need to be assigned. The oral test may be given concurrently with the practical test or be administered separately before or after the practical test. Oral and practical tests are graded as soon as they are

completed, and examinees are informed at once of their grades. If the candidate is successful, the examiner will issue a temporary mechanic certificate immediately; the FAA issues a permanent certificate upon confirmation of the certification process.

Accreditation

Accreditation of an AMTS consists of a five-phase process: pre-application, formal application, document compliance, demonstration and inspection, and certification (accreditation). These phases may overlap and can proceed concurrently. Application is made through the local FSDO. Program inspections are conducted by FAA inspectors. When all the regulatory requirements have been met, the school is issued an Air Agency Certificate. The FAA inspects and observes newly certified schools frequently during the first 90 days of operation to assess compliance with the applicable FAR.

When an AMTS applies to the FAA for accreditation, it enters into a regulatory agreement with the FAA to allow itself to be inspected by the FAA at any time. Inspections typically are conducted every 6 months.

Observations

- The FAA certification and accreditation program is comprehensive in its institutionalized approach and its impact on the aviation industry.
- Its status as a federal program of more than 40 years' duration, made it unfeasible to assess its start-up costs and ongoing operational costs.
- Schools are willing to spend the required money to meet the demands of mandatory programs. It is not known whether an industry mandate carries the same weight as a federal mandate. However, certification is voluntary rather than mandatory, and nearly all aviation mechanics seek certification.

International Society of Certified Electronics Technicians

The International Society of Certified Electronic Technicians (ISCET) is housed in the offices of the National Electronic Sales and Service Dealers Association. The ISCET certification program for electronics technicians has approved some 40,000 persons since its founding in 1965. It is a voluntary program designed to help employers job applicants who meet standards of work preparation from those with less training and to give them a means of assuring customers of the quality of work performed.

An estimated 40,000 individuals are certified by ISCET, and approximately 1,800 win certification annually.

Program Content, Structure, and Management

ISCET offers a series of five certification exams: associate level CET, journeyman level CET, certified appliance technician, FCC (Elements 1,3,5,6,7,8, and 9), and ISCET FCC Rules and Regulations.

The associate level exam is multiple choice with about 100 questions covering basic electronics, math, DC and AC circuits, transistors, semiconductors, instruments, measurements, and troubleshooting. It does not include a performance component.

The journeyman exam includes the CET test and one or more optional sections on audio, communications, computer, consumer, industrial, medial, radar, and video electronics.

The certified appliance technician exam, which is relatively new, is a 100-question multiple choice exam covering electrical circuits and components, refrigeration systems, laundry equipment, cooking equipment, dishwashers, and trash compactors.

ISCET directly operates and administers its certification program. The society employs a full-time staff person to score and report test results. The program's annual budget is approximately $49,000. Test takers currently pay $25 per test, $12.50 for the first retest, and $25 for subsequent retests. Until 1994, retesting was free. ISCET seeks to cover the total costs of operating the testing program with fees.

Process

ISCET publishes a list of volunteer test administrators with whom the individual examinee independently schedules an examination schedule. The tests are given at local technical schools. To pass the entry-level test, examinees must score at least 75 percent. Certification at the entry level is valid for 4 years. Journeyman certificates, which require 4 years of education, experience, or a combination of both in electronics, are permanent.

Observations

- Certification and accreditation programs can be shown to increase technician competence and enhance customer satisfaction, but there is little evidence to quantify the benefit to an industry of having both certification and accreditation.

- Although well established programs can claim significant participation and acceptance by their industries, it is unclear what level of industry commitment and interest it takes to start and maintain either program. Neither is it clear which program should be started first — accredit training programs or certification of individuals.

National Institute for Automotive Service Excellence
National Automotive Technicians Education Foundation

The National Institute for Automotive Service Excellence (ASE) was established in 1972 as a joint effort of the domestic vehicle manufacturers and automobile dealers to create a certification program for automotive service technicians. Since 1982, the National Automotive Technicians Education Foundation (NATEF), a not-for-profit corporation, has accredited automotive training programs on ASE's behalf. Over 374,000 technicians currently hold ASE certification, and approximately 1,000 training programs are accredited by NATEF.

Program Content, Structure and Management

Certification

ASE offers eight specialty exams for auto technicians - engine repair, brakes, electrical/electronic systems, automatic transmission/transaxle, manual drive train and axles, suspension and steering, heating and air conditioning, and engine performance. Six tests are offered in medium/heavy trucks, four in body/paint, three for engine machinists, one in light vehicle compressed natural gas, one for advanced engine performance specialists, and 15 for recertification. Each test contains 40 to 80 questions. Although ASE has found that hands-on competency testing is too complex and expensive for national administration, it has found that written exams stressing real-world problems can provide a good assessment of diagnostic and repair abilities. Each year over 200,000 individuals register for ASE exams; approximately two-thirds of the examinees are approved.

ASE manages its certification program. It is administered by American College Testing (ACT), which also scores the tests. The program is self supporting, but it took many years of industry commitment and financial support to make it so. A $20 fee is charged for registration; tests typically cost $15 apiece.

Accreditation

NATEF accredits mechanic training programs in automobile, auto body, and medium and heavy trucks. Evaluation is based upon NATEF standards in purpose, administration, learning resources, finances, student services, instruction, equipment, facilities, instructional staff, and cooperative work agreements.

The Foundation employs a staff of four to manage the program. The program is funded in part by contributions from industry organizations and income generated from the sale of accreditation evaluation materials, but NATEF relies on ASE for significant additional support. Its current annual budget for operating the accreditation program is approximately $300,000. Accreditation fees were increased this past spring now averaging $630 to $670 for an individual training institution; re-accreditation costs $420 on average.

Process

Certification

ACT conducts tests twice a year at over 600 locations nationwide. Applicants may take up to four regular or advanced tests on the same day or as many recertification tests as they choose. A mechanic must provide proof of 2 years' hands-on work experience before being eligible to take the exams. Relevant formal training may be substituted for up to 1 year's work experience. Completion of a 3- or 4-year bona fide apprenticeship program may entitle the applicant to full credit for the 2-year hands-on work requirement. An eligible applicant can become an ASE-certified automobile technician upon passing at least one auto exam.

Test questions are developed by a panel of technical service experts from vehicle manufacturers, repair and test equipment and parts manufacturers, working technicians, and educators. The questions are based on skill standards, which are reviewed every 2 years in order to keep the test current with industry skill needs and knowledge requirements. All questions are pretested and quality-checked with a national sample of technicians. Tests are updated every 18 months to 3 years.

Applicants receive a report of test results by mail about 10 weeks after the test date. The report describes strengths and weaknesses. ASE will not release test scores over the telephone or report them to anyone but the test taker without that individual's expressed written consent. However, ASE will confirm whether an individual holds ASE certification and the areas certified.

Recertification is required every 5 years.

Accreditation

Accreditation involves a process of self-evaluation by the program and formal evaluation by an external team. The standards are uniform throughout the nation and have been field tested and validated by teams of experts assembled under the auspices of the Automobile Mechanic Training Evaluation Project and directed by the Industry Planning Council of the American Vocational Association. Training programs meeting the requirements are accredited by NATEF for 5 years.

Observations

- Although the ASE technician certification program now has the full collaboration of major segments of the automotive industry, it was initiated by only two — domestic manufacturers and dealers. EIA may want to identify those segments of the electronics industry whose support is vital for successful implementation of a

certification program and to gain that support before a final decision to launch is made.

- The ASE certification program required many years of industry commitment and financial support before it became self supporting.

- Early in the development of the accreditation program, ASE determined that accreditation of individual training programs could not be a self-supporting operation. By establishing NATEF as a not-for-profit foundation, ASE made it possible for industry and others to make tax-deductible contributions in support of the program.

Printing Industries of America

The Georgia affiliate of the Printing Industries of America (PIA) developed the PrintED accreditation program in 1986-87 at the request of the Georgia State Department of Education. PIA adopted the program nationally in 1990, and in March 1991 PrintED accredited its first program in Oklahoma. The program, which provides instructional and program guidance to vocational printing programs, has been adopted as a viable and realistic industry accreditation process for secondary and post-secondary graphic arts programs.

Currently, 31 programs have been accredited in 12 states, and over 500 self-evaluation notebooks have been sent out. Additionally, 300 schools have attended PrintED workshops with 100 of them paying the $50 application fee to formally begin the accreditation process.

Program Content, Structure and Management

The PrintED program is modeled closely on the NATEF program for the accreditation of automotive technician training programs. Program accreditation is based on nine key standards, adherence to which assures that the program is capable of training entry-level workers for the graphic arts industry. These standards cover purpose, administration, learning resources, program budget, student services, instruction, equipment, facilities, and instructional staff.

PrintED also has identified 500 critical tasks or competencies that have been grouped into nine instructional areas - six basic and three advanced: Introduction to Printing, Electronic Imaging, Reproduction Photography, Basic Offset Press, Image Assembly/Platemaking, and Finishing/Binding and Advanced Press Operations, Advanced Electronic Prepress, and Advanced Image Assembly/Platemaking. To achieve accreditation, a program must meet program standards in a minimum of two areas, including Introduction to Printing.

PIA manages the program nationally but it is administered through PIA affiliate associations in each state, which in turn, work with local schools. Since 1991 Rockwell Graphic Systems has provided major financial sponsorship: $40,000 for the first 2 years, $25,000 for the 3rd year, and $10,000 for the 4th and final year. PIA has submitted proposals to several potential sponsors requesting sponsorship of up to $25,000. The current $13,000 budget provides for a staff administrator who devotes one-third time to the program, printing costs, workshops, and program-related materials.

Process

The PrintED accreditation process costs participating programs approximately $700. Programs seeking accreditation submit a letter of intent and request an accreditation package, which includes instructions for self evaluation by the training institution. If necessary, the institution upgrades its program against PrintEd standards and initiates the PrintED instruction system, using it for at least 1 full year. After that, the institution can request a PIA field team for on-site evaluation. Accreditation is good for 5 years with reaccreditation taking place at the end of the 5th year. PIA Georgia has reaccredited all of its initial programs.

Observations

- PrintED has successfully expanded a state program into a national program, suggesting that a statewide pilot program may be a feasible beginning.

- PrintEd's success suggests that industry involvement in all aspects of a program's development, implementation, and ongoing operations is crucial to that success because it assures that accredited programs do indeed produce graduates who meet minimum requirements for entry-level employment.

IV. Conclusions

The structure of every industry is unique and the certification and accreditation programs that have been developed to date to serve the needs of differing fields reflect their various characteristics: In some, corporate opinion, focused through one or more leading trade association, can drive a program, make certification or accreditation as good as mandatory, and assure program success. In other trades, particularly those where employment is scattered among tens of thousands of small companies, it may be far more difficult to create a groundswell of acceptance and desire for a program of assessment and approval. In still others, often highly skilled technical or professional occupations, demand for certification may be small but focused and the small numbers of certificate holders may be highly prized within their field.

With this degree of variety, organizations contemplating establishment of certification or accreditation programs must determine those factors important to them in the program and

those characteristics significant to their industry. With those in mind, some or all of the following conclusions may be of value.

- Before developing either a certification or accreditation program, an organization should determine a clearly stated set of goals for the program and garner wide-spread industry backing for it with accompanying commitments of financial and in-kind support.

- The development of industry-wide skill standards can create an agreed-to basis for a certification exam or training program accreditation standards we well as an industry-wide network of support among employers and educators.

- A program can be initiated successfully without full industry support as long as the initial supporters represent large and influential segments of the industry. It is important to identify whose support is vital for successful implementation of a certification or accreditation program and to gain that support during the decision-making process.

- Pilot testing a program at the state level gives an organization the opportunity to establish system and process, assess demand, and gauge success before the necessary investments of time, money, and staff are made to implement a national program.

- When demand for certification is intensive but not extensive (e.g., in highly specialized fields in which a high degree of consumer safety can be attributed to competence), the few persons who need the credentials will invest time, travel, and substantial fees to take the exam because employers will pay a premium for credentialed workers.

- Independent practitioners or those likely to work for small independent firms are most likely to seek certification early in their careers in order to strengthen their resumes and enhance their credentials. Demand is clearly tied to career rewards.

- When nearly 100 percent of the employees an industry hires are certified, nearly all workers will pursue certification, whether it is mandatory in the narrowest sense or not.

- When certification is geared to entry-level workers, examinations can be promoted effectively through training programs and at training sites.

- Large numbers of potential examinees in a field do not guarantee a demand for certification. There must be industry consensus that certification is valuable before industry will pay a premium for certified workers. Without demand for certificate holders, there will be little demand for the exam.

- It may be difficult to create demand for a certification program in a field in which employers view paper and pencil testing as a limited measure of competence.

- An organization or industry may need to devote many years of commitment and financial support to a certification program before it becomes widely accepted, valued, and self supporting.

- When there is evident demand for graduates of accredited training programs, schools are willing to spend the money necessary to meet accreditation standards.

- If an organization determines that an accreditation program is not likely to become self supporting, it can encourage industry support of the program by establishing a nonprofit, tax-deductible foundation to manage it.

There are questions this study has not answered. Some were outside the original scope of the work; others proved too complex for a telephone interview or beyond the institutional memory of people available to provide help. Nonetheless, their consideration may be useful to organizations and industries considering evaluation programs.

- This study did not explore whether the combination of certification of individuals and accreditation of training programs for a single occupation increases the benefit to the industry of either assessment program alone.

- Because few of the programs studied included performance testing, no conclusion could be drawn as to whether they are significant or essential. For example, one might ask whether a performance component might increase the value of certification to craft-based occupations like carpentry and masonry.

- It is clear that significant industry acceptance and participation are crucial to the success of well established programs. It is unclear, however, what level of interest and commitment is needed to start and maintain either certification or accreditation programs.

- This program did not assess the level of interest and cooperation necessary to obtain from the vocational education community in order to implement an accreditation program.

- This study made no attempt to ascertain whether it is of greater value to implement a certification program before an accreditation or vice versa when an industry expects eventually to support both.

APPENDIX A

STATE-OF-THE-ART STUDY
CERTIFICATION AND ACCREDITATION PROGRAMS SUMMARY

STATE-OF-THE-ART SURVEY
CERTIFICATION AND ACCREDITATION PROGRAMS SUMMARY

Organization	PrintED	FAA	ASE/NATEF	ETA	AICP	AGC	ASNT	AWS	ISCET
Certifies Individuals? (Y/N)	N	Y	Y	Y	Y	Y	Y	Y	Y
Accredits Training Programs? (Y/N)	Y	Y	Y	N	N	Y	N	N	N
Program Mgmt: Internal (I); Contract (C); Both (B)	I	I	B	I	B	I	I	I	I
Number of years Certifying (C); Accrediting (A)	A - 4	40+ Years	C - 20+ A - 10+	C - 30	C - 15	C - 6 A - 20+	C - 40	C - 19	C - 31
# of Individuals Certified (C) (Est); Inst. Accredited (A)	A - 31	C - 350,000 A - 200+	C - 340,000 A - 1,000	C - 35,000	C - 7,600	C - 6,000 A - 225	C - 10,000	C - 17,000	C - 40,592
# approved/yr.: Individuals (C); Training Programs(A)	A - N/A	C - 14-18K A - N/A	C A - N/A	C - 350	C - 500-600	C - 600 A - N/A	C - 1,100	C - 1,400	C - 1,802
Test Sites	N/A	FSDO or WTEs	Schools	Schools	Colleges	Local Chapters	Hotels	Voc. Tech. Ctrs.	Tech. Schools
Test Supervisors	N/A	DMEs	ACT	Volunteers	Test Center Staff	Local Reps	Staff	N/A	Certified Volunteer Administrators
Budget: Certification (C) Accreditation (A)	A - $13,000	N/A	C - A - $300,000	C - $36,000	C - $208,000	C - 40,000 (Est.)	C - $200,000 (Est.)	C -$200,000 (Est.)	C - $49,675 (Est.)
Fees Certification (C); Accreditation (A)	A - $700	C - N/A A - None	C - $20+15/test A - $650	C - $30	C - $210	C - $30 A - 0	C - $375 - $815	$310	$25
% cost covered by fees Certification (C); Accreditation (A)	A <50%	C - N/A A - N/A	C - 100% A -	C - 100%	C - 100%	C - 50% A - 0%	C - 100%	C - 100%	C - 100%
Certification Program Content Reqs: Eligibility Experience - yrs. (E) Knowledge Test (K) Performance Test (P) Passing Score (S)	N/A	E - 1-1/2 K - Yes P - Yes S - 70%	E - 2 K - Yes P - No S - 70%	E - 4 K - Yes P - No S - 75%	E - 2-8 K - Yes P - No S - N/A	E - 2 K - Yes P - Work S - 70%	E - Yes K - Yes P - No S - Yes	E - K - Yes P - Yes S - 72%	E - Yes K - Yes P - No S - 75%
# Program Staff: Certification (C); Accreditation (A)	A - 1/3FT	N/A	C - A -4	C - 2	C - 1 FTE	C - 1 A -	N/A	C - N/A	C - 4 F/T 3 P/T
Accreditation Program Content Reqs: Industry Based Curriculum (C) Certified Instructors (I) Minimum Equipment (E)	C I E	C I E	C I E	N/A	N/A	C	N/A	N/A	N/A

APPENDIX B

QUESTIONS FOR CASE STUDY

Appendix B

QUESTIONS FOR CASE STUDY

Introduction

- How/Why did your organization begin the program?

Program Structure

- Does your organization certify individuals or accredit training institutions?
- How long have you been certifying/accrediting people/agencies?
- How many institutions are accredited?
- How many individuals are certified?
- How many in each category are approved each year?

Management

- Does your agency directly control the certification or accreditation process or is any function subcontracted?
- What is your annual budget for operating the accreditation/certification program?
- Approximately what percentage of costs is covered by the fees paid?
- Program staffing
  - Types and numbers by expertise
- What are the fees and when are they paid?

Accreditation

- How long a time is accreditation valid?

Certification Exams

- What are the eligibility requirements for taking the certification exam?
- Is performance tested?
  - How is the testing supervised?
  - If performance testing is included how are the evaluators trained?
  - Where is the testing performed?
- How often are tests given?
- Are there multiple levels of certification?
- If there is more than one form of a test, how do you assure comparability across forms?